

What is Claimed is:

1. A polynucleotide sequence optimized for expression of an insecticidal protein in a plant wherein said polynucleotide sequence comprises a sequence selected from the group consisting of from about nucleotide position 7 through about nucleotide position 1803 as set forth in SEQ ID NO:3, from about nucleotide position 2650 through about nucleotide position 4446 as set forth in SEQ ID NO:5, from about nucleotide position 3047 through about nucleotide position 4844 as set forth in SEQ ID NO:8, from about nucleotide position 1247 through about nucleotide position 3043 as set forth in SEQ ID NO:11, and from about nucleotide position 1658 through about nucleotide position 3454 as set forth in SEQ ID NO:13.
2. The polynucleotide sequence according to claim 1 wherein said sequence is SEQ ID NO:3 from about nucleotide position 7 through about nucleotide position 1803.
3. The polynucleotide sequence according to claim 1 wherein said sequence is SEQ ID NO:5 from about nucleotide position 2650 through about nucleotide position 4446.
4. The polynucleotide sequence according to claim 1 wherein said sequence is SEQ ID NO:8 from about nucleotide position 3047 through about nucleotide position 4844.
5. The polynucleotide sequence according to claim 1 wherein said sequence is SEQ ID NO:11 from about nucleotide position 1247 through about nucleotide position 3043.
6. The polynucleotide sequence according to claim 1 wherein said sequence is SEQ ID NO:13 from about nucleotide position 1658 through about nucleotide position 3454.
7. A polynucleotide sequence encoding an insecticidal protein, said protein being selected from the group consisting of SEQ ID NO:2 from about amino acid position 2 through about amino acid position 600, SEQ ID NO:4 from about amino acid position 3 through about amino acid position 601, SEQ ID NO:7 from about amino acid position 3 through about amino acid position 601, SEQ ID NO:10 from about amino acid position 3 through about

amino acid position 601, SEQ ID NO:12 from about amino acid position 3 through about amino acid position 601, and SEQ ID NO:14 from about amino acid position 3 through about amino acid position 601.

8. The polynucleotide sequence of claim 7 wherein said polynucleotide sequence encoding said protein is selected from the group consisting of SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:8, SEQ ID NO:11, and SEQ ID NO:13.

9. A expression cassette comprising the polynucleotide sequence substantially as set forth in SEQ ID NO:3 which functions in plants to produce an insecticidal protein, wherein said expression cassette is selected from the group consisting of SEQ ID NO:5, SEQ ID NO:8, SEQ ID NO:11, and SEQ ID NO:13.

10. A plant comprising a polynucleotide sequence optimized for expression of an insecticidal protein in a plant wherein said polynucleotide sequence comprises a sequence selected from the group consisting of from about nucleotide position 7 through about nucleotide position 1803 as set forth in SEQ ID NO:3, from about nucleotide position 2650 through about nucleotide position 4446 as set forth in SEQ ID NO:5, from about nucleotide position 3047 through about nucleotide position 4844 as set forth in SEQ ID NO:8, from about nucleotide position 1247 through about nucleotide position 3043 as set forth in SEQ ID NO:11, and from about nucleotide position 1658 through about nucleotide position 3454 as set forth in SEQ ID NO:13.

11. A seed or progeny produced from the plant of claim 10, wherein said seed or progeny comprises said sequence selected from the group consisting of from about nucleotide position 7 through about nucleotide position 1803 as set forth in SEQ ID NO:3, from about nucleotide position 2650 through about nucleotide position 4446 as set forth in SEQ ID NO:5, from about nucleotide position 3047 through about nucleotide position 4844 as set forth in SEQ ID NO:8, from about nucleotide position 1247 through about nucleotide position 3043 as set forth in SEQ ID NO:11, and from about nucleotide position 1658 through about nucleotide position 3454 as set forth in SEQ ID NO:13.

12. A plant cell comprising a polynucleotide sequence optimized for expression of an insecticidal protein in a plant wherein said polynucleotide sequence comprises a sequence selected from the group consisting of from about nucleotide position 7 through about nucleotide position 1803 as set forth in SEQ ID NO:3, from about nucleotide position 2650 through about nucleotide position 4446 as set forth in SEQ ID NO:5, from about nucleotide position 3047 through about nucleotide position 4844 as set forth in SEQ ID NO:8, from about nucleotide position 1247 through about nucleotide position 3043 as set forth in SEQ ID NO:11, and from about nucleotide position 1658 through about nucleotide position 3454 as set forth in SEQ ID NO:13.

13. A method for producing a transgenic plant cell expressing an insecticidal Cry1Bb endotoxins fragment, said method comprising transforming a plant cell with a polynucleotide sequence comprising a plant functional promoter operably linked to a nucleotide sequence encoding said fragment wherein said nucleotide sequence is selected from the group consisting of from about nucleotide position 7 through about nucleotide position 1803 as set forth in SEQ ID NO:3, from about nucleotide position 2650 through about nucleotide position 4446 as set forth in SEQ ID NO:5, from about nucleotide position 3047 through about nucleotide position 4844 as set forth in SEQ ID NO:8, from about nucleotide position 1247 through about nucleotide position 3043 as set forth in SEQ ID NO:11, and from about nucleotide position 1658 through about nucleotide position 3454 as set forth in SEQ ID NO:13.

14. A method for producing a transgenic plant resistant to lepidopteran insect infestation comprising:

a) transforming a plant cell with a polynucleotide sequence comprising a plant functional promoter operably linked to a nucleotide sequence encoding an insecticidal Cry1Bb delta endotoxin fragment; and

b) regenerating a transgenic plant from said plant cell, wherein said transgenic plant comprises said polynucleotide sequence and expresses insecticidally effective amounts of said fragment.

15. A method for producing a transgenic plant resistant to insect infestation comprising breeding together

a) a first plant transformed to contain a first nucleotide sequence encoding a first Bt insecticidal protein and a first selectable marker with

b) a second plant transformed to contain a second nucleotide sequence different from the first, wherein said second nucleotide sequence encodes a second Bt insecticidal protein different from the first, and a second selectable marker different from the first

wherein said transgenic plant comprises both the first and the second nucleotide sequences;

wherein the first and the second selectable markers are selected from the group consisting of antibiotic resistance genes, herbicide resistance genes, and genes encoding enzymes that react with a substrate to form a product that is visually or immunologically observable;

wherein the first Bt insecticidal protein comprises an insecticidal fragment of a Cry1Bb protein as set forth in SEQ ID NO:3 from about nucleotide position 7 through about nucleotide position 1803; and

wherein the second Bt insecticidal protein is selected from the group of toxins consisting of a Cry1, Cry2, Cry3, Cry4, Cry5, Cry6, Cry9, Cry22, a Cry binary toxin, a VIP toxin, a TIC901 or related toxin, and combinations thereof.

16. The method of claim 15 wherein said herbicide resistance genes are selected from the group consisting of a gox gene, a gene encoding an EPSPS that is insensitive to glyphosate inhibition, a phnO gene, a bar gene, and a glyphosate acetylase gene.

17. A nucleotide sequence encoding at least an insecticidal fragment of a Cry1Bb delta endotoxin protein, said protein comprising an amino acid sequence as set forth in SEQ ID NO:4 from about amino acid position 3 through about amino acid position 601, wherein said nucleotide sequence hybridizes under stringent conditions with a nucleotide sequence as set forth in SEQ ID NO:3 from about nucleotide position 7 through about nucleotide position 1803.

18. A composition comprising an insecticidally effective amount of a Cry1Bb endotoxin protein or insecticidal fragment thereof expressed in a plant from a segment of a nucleotide sequence as set forth in SEQ ID NO:3 from about nucleotide position 7 through

about nucleotide position 1803 or from a nucleotide sequence encoding said protein or fragment thereof that hybridizes to said segment.

19. A biological sample derived from a plant, tissue, or seed, wherein said sample comprises a nucleotide sequence which is or is complementary to a sequence selected from the group consisting of SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:8, SEQ ID NO:11, and SEQ ID NO:13, and wherein said sequence is detectable in said sample using a nucleic acid amplification or nucleic acid hybridization method.

20. The biological sample of claim 19 wherein said sample is selected from the group consisting of corn flour, corn meal, corn syrup, corn oil, corn starch, and cereals manufactured in whole or in part to contain corn by-products.

21. An extract derived from a corn plant, tissue, or seed comprising a nucleotide sequence which is or is complementary to a nucleotide sequence selected from the group consisting of SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:8, SEQ ID NO:11, and SEQ ID NO:13.

22. The extract of claim 21 wherein said sequence is detectable in said extract using a nucleic acid amplification or nucleic acid hybridization method.